BIO-DYNAMICS

A periodical furthering soil conservation and increased fertility in order to improve nutrition and health.

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SUMMER CONFERENCE — 1957

Problems of human nutrition in terms of its foundations — health and balance in animals, plants and soil — were a major aspect of the 1957 Conference of the Bio-Dynamic Farming and Gardening Association, held at Threefold Farm, Spring Valley, N. Y., August 2nd, 3rd and 4th. The implications of recent research, and the consequent ever-growing importance of a truly scientific foundation for organic farming and gardening were forcefully brought out in a lecture by Dr. Ehrenfried E. Pfeiffer on the last morning of the well-attended three day meeting.

He noted that until very recently *over*-consumption of foods was not a major concern of the nutritionist. All the emphasis was on the dangers of protein and vitamin deficiencies in foods and NPK deficiencies in soils. Yet research by various scientists in the last two years, he continued, has shown that excess is frequently as dangerous as are deficiencies. Excess, he added, is hard to diagnose, and excess of one factor is often diagnosed as deficiency of another.

Taking nitrogen fertilizing of soils as an example, the speaker referred to the long-known fact that the more nitrogen you gave, the more yield you got. One result was that in this way you could also increase the protein content of crops. But, citing recently published research, he added that it has now been established that the feeding value of *this* protein is inferior even to that of unfertilized crops, because the amino acid pattern has been disturbed, and lysine is lacking.

Furthermore, plants over-fertilized with nitrogen show, for instance, potassium and magnesium deficiency symptoms, and the grower is advised to add more of these to his fertilizer. Yet a thorough analysis of the soil shows, at the same time, the presence of both in sufficient amounts. The same difficulties arise with regard to human nutrition, and Dr. Pfeiffer advised that in his opinion individuals should be wary of accepting unquestioningly the reports as to safety levels of various food supplements, since safety levels vary in each human being as they do in each soil and plant.

He held that in the end the future of the individual and of the race was dependent on "the point of view and the philosophy that you apply."

EDITORIAL BOARD OF BIO-DYNAMICS: ALICE HECKEL, EDITOR; FRED HECKEL, ASSISTANT EDITOR; PETER ESCHER, NEWS EDITOR.
Threefold Farm Spring Valley, N. Y.

"My point of view and that of Biodynamics and the Natural Foods movement is a biological point of view, based on biological science. We in the B.D. movement have been stimulated by the philosophy of its founder, the late Rudolf Steiner, who, 30 to 40 years ago pointed out the problem of *balance* in relation to life and growth."

Points referred to by Steiner, he said, were then generally not known, "but are gradually becoming known." He instanced recent Harvard studies on nutrition showing, among other things, strong evidence that obesity was the cause of many degenerative diseases, and stating that the narrow margin between deficiency and excess was dependent on many factors, including environment. Often what we call the minimum daily requirement of a particular item is at the same time the maximum.

For some time there have been laws on the statute books requiring a specified Vitamin D content in certain foods. Now physicians are discovering increasing numbers of cases of excess calcium deposits and even calcification of the heart muscle in babies, due to the excessive use of Vitamin D. There have been widespread reports of this from England, and the lecturer quoted from a recent scientific publication a question as to whether there was not now more illness due to the excessive use of Vitamin D enriched products than the rickets it was designed to prevent.

Pointing out the doubtful effects of excessive ammonia fertilization on proper biological functioning in soils, which need aerobic fermentation to produce a stable humus, he again drew a parallel with physiological processes of the human body. Here ammonia is formed in the process of the breakdown phase of metabolism, and if it is not, in turn, transformed to urea in the liver, disease conditions can arise, particularly in the brain where this is known as "ammonia coma." The only way to remove ammonia from the brain is by glutamic acid, one of the amino acids; glutamic acid being able to remove ammonia and bring in oxygen.

The same process takes place in the soil in the formation of humus. The soil is de-toxified by humus as the brain is by glutamic acid. This leads to the fact, recently demonstrated, that mental disease is largely due to a faulty bio-chemistry of the metabolism, f. i. in brain and liver, and also that the balanced nutrition that can work against such a condition depends on the way the foodstuffs are grown in the soil. When Rudolf

Steiner, in giving the first Biodynamic agricultural instruction, said that the processes in the brain were a continuation of processes in the intestines, people described this as "Anthroposophical, mystical nonsense."

"Now," the speaker continued, "I read the same facts with regard to the bio-chemistry of the brain in the publications of the latest bio-chemical research. And here we come back to a point of philosophy. The Russians also know these facts and on this basis would, from the point of view of dialectical materialism, use them to interfere with the functioning of nature and society. They see no moral concept involved."

Dr. Pfeiffer went on to cite the advertising and indiscriminate use of vitamin preparations. Often, as is the case with amino acids, the margin between deficiency and excess is so narrow that the use ought to be left to the authority of skillful physicians and nutritionists. He predicted that the time would come when it was recognized that the use of natural supplements in natural foods is harmless, while artificial supplementation may be harmful.

Here, he said, we are brought back to the importance of the philosophy we practice. We may or may not realize that Nature contains wisdom and intelligence, and the best we can do is to understand and accurately describe Nature and natural processes. No human being can reproduce living matter, we can only recognize in Nature the wisdom of the Creator and the Creator-made natural laws.

"It is not that I want to propagate a philosophy. I merely want to point out that no matter what the data, what the facts are, that we have to deal with, it is our point of view that will decide whether we have a future, whether we have balance or not.

"With vitamins, one can get away with an excess for a while; with amino acids, twice the daily minimum requirement can be toxic. Yet I already see a manufacturer advertising 'Correct Your Amino Acid Balance'.

"The University of Wisconsin has already done considerable research in this field and warns that amino acids are not to be supplemented by any product, and that people should leave it to Nature to do the balancing.

"The path is not via manufactured supplements, but via improved products from improved soil and balance. This is why we talk Biodynamics. We learned these things 35 years

ago, and have tried to learn the practice of them ever since."

In a lecture at the opening session of the Conference, Dr. Pfeiffer went into detailed application of some of these principles of balance to the fertilizing of the soil. He told first of a farm which he had been asked to survey a few weeks previously, while he was on a trip to Germany in connection with composting of municipal garbage. The farm in question had been run on organic lines for several years, and the owner had been losing money and did not know why.

The cows appeared to be in perfect condition, and the health situation in the herd was perfect. Milk production was on the upper level. In the fields there was a high 2nd cutting of alfalfa coming along, and the pastures, clover fields and potato fields looked fine. Dr. Pfeiffer did notice that the cows had a certain change in the formation of hooves and horns. They showed a whitish ring, and the horn material was slightly brittle near this ring. Since disturbances of the metabolism show up in this way, he asked the manager whether there had been any change in the nutrition of the animals last February. The manager looked embarrassed and then confessed that he had run out of hay in February and had had to buy hay — of a different nutritional value.

Figuring the acreage in hay in relation to the livestock carried, there should have been plenty to carry them through. However, the manager said, the cows were never satisfied with the normal amounts of home-grown hay and had to be given three times as much.

Soil profiles gave the answer: there was only a shallow layer of fertile, humus soil, and then a hardpan penetrated by almost no plant roots. Thus all the necessary minerals and trace elements were unavailable to the plants. The alfalfa had no nitrogen-fixing nodules, and so it too was robbing the soil instead of building it up. Thus, these people who had thought they were doing a good organic job were, instead, depleting the soil.

Analyses then made of the plants showed that they were deficient in feeding value; therefore the farm had had to buy hay, and this purchase money accounted for the losses.

That farm exemplified a world-wide situation, he continued, since "the natural resources which could be present in the soil are no longer available to the plants". The only plants showing all the elements they should were the trees, perennials and

weeds, weeds being "the remedy of Nature for curing the separation of the soil into two layers".

Dr. Pfeiffer emphasized that if the aeration of a soil is incomplete — with a consequent anaerobic fermentation in the lower layer, "your other measures defeat their own purpose".

He went on to tell of the first run of a new municipal garbage composting plant built according to his specifications and operated according to his methods, at the small city of Erlangen, Germany.* Because of the accidental omission of a water line for keeping the compost moist, the fermentation had had to take place at a relatively low moisture level. *with the result that the first pile was usable in ten days.* This phenomenon, he said, amounted to a rediscovery of something that had been found in studies of the soils of the Ukraine, published in 1911. Such an intensive humus formation, the product of 80% azotobacter and 20% actinomycetes, can only take place if there is a true balance between precipitation and evaporation, the soils (or compost piles) never being too wet and yet never drying out completely.

As a result of what has been learned from these recent experiences, Dr. Pfeiffer said, all the problems of the compost pile can now be measured quantitatively, "and so we are at the birth of an organic, or biological, age. It is now a scientifically accessible field".

Going into the question of the 30% increase in protein content of grains that can be achieved by intensive ammonium sulfate and ammonium nitrate fertilizing, he said that studies of the amino acids show that these grains are deficient in lysine and tryptophane, both absolutely essential to balanced nutrition and health, while plants receiving organic nitrogen have adequate amounts of both acids. He stressed the fact that all this was a new field of research, but expressed his belief that in twenty years there would be a complete revolution in agricultural methods, feeding and nutrition.

In one of the question periods at another session of the Conference, Dr. Pfeiffer was asked, "What is Biodynamics, and how do you start it?"

"You start work", he said, "if you make compost or treat manure with the B.D. Preparations or Starter, because in this way you introduce biological processes into the material, and via it into the soil.

* A report in detail will appear in a later issue.

"But this is only one part of the B.D. Method. The other you do yourself, i.e., *you establish a suitable crop rotation which guarantees that the biological balance in the soil is maintained.* This is simple to say, but not so easy to follow. You need constantly to maintain your soil fertility, and for this you need proper *cultivation.* Soil fertility cannot be maintained by the use of any kind of fertilizers, chemical, B.D. or organic, alone or in combination. The soil is a living system, a living organism, and must remain friable. The maintenance of an aerated physical structure is paramount."

Returning to the importance of a proper crop rotation, he said that monocultures, such as the growing of corn year after year, "eventually will come back at you. You don't need to study any philosophy to see the truth of this, but don't expect us to give you 'a shot in the soil' so you can continue wrong practices.

"What we really want to do is to rebuild soils so that they can come back. And in this connection, if you are fleeing the city and buying a farm somewhere, please remember that unless you are getting virgin land you are buying the errors of your predecessor."

Biodynamics as a scientific approach to the problems of the home gardener was the topic of a lecture by Peter Escher. He began by stating that basically the problems of the farmer or commercial grower and the home gardener are the same, with the latter having the advantage that he can get better acquainted with his soil.

One great difference between the soil of the commercial truck grower and the home gardener, Mr. Escher pointed out, is that the home owner generally selects his home first, for a variety of other reasons, and the garden comes later in the space adjoining the house. On what soil he happens thus to get a great deal depends. He often has difficult soils to contend with. A good loam is preferable. A clay soil is harder to handle and shows errors of handling more readily. A sandy soil, on the other hand, dries out quickly, and while it responds more readily to organic treatment, it also depletes faster.

Crop rotation problems are greater for the home gardener than for the farmer, since as soil builders among the garden vegetables there are primarily only beans and peas and an occasional mung bean. At best, legumes constitute only a small percentage of the vegetable crop. Thus the fertilizer require-

ments of a garden have to come from other sources: compost, and leguminous green manuring such as a mixture of vetch and rye.

Green manuring crops, he continued, should be plowed under, or spaded, when they are still in the green stage. They should be well worked into the soil. The heavier the soil, the better they should be worked in, but not deeper than 6 to 8 inches.

The speaker stressed the fact that if one just plows or turns under the material, the soil bacteria will be absorbed in breaking down the green-manuring crop and thus will not be available for the first crop to be planted after it, which can lead to a crop failure. If one adds nitrate fertilizer, it has been found that the nitrate-forming bacteria in the soil "go to sleep" as it were, and are not utilized. Compost can be added to the crop to be plowed under, but this entails additional work and working in. He said experience had shown it was simpler to use the Starter, spraying it over the green-manuring crop just before turning it in. The suggestion further was that if the soil is dry at the time, water should be added to ensure enough moisture (taking care not to use too much — so that the soil does not pack). The Starter, he said, assures the supply of soil bacteria necessary to break down the green manuring crop and maintain and increase the materials available to the next crop.

"In practice," Mr. Escher said, "up to one half of the garden can be green-manured. Suppose you have a garden in a deficient soil and want to improve it. In Fall you green-manure half and next Spring you plant the early crops in the other half. A little later you plow under the green manure and plant the late crops. After the early crops have matured, you plant a cover crop to be plowed under in Fall."

He advised using at least 10 tons per acre of a good compost every year on the garden. He noted that plants differ in the kind of compost they require, corn, for instance, thriving on a raw compost with tomatoes next in line, requiring a compost a little more broken down.

If your have a clay soil and are in a climate where there is frost, he advised turning the soil roughly in Fall, to permit freezing and thawing, which helps toward getting a better soil structure. He stressed the essential importance of good drainage and warned against handling soil, or even walking on it when it is too wet. "This has been said over and over again," he added, "yet farmers and gardeners sometimes slip, and *that*

slip is costly." He advised against the use of herbicides to keep weeds down, since "it has been found that they change the enzymatic reactions in plants supposed to be protected by the weedicides. That is exactly what we want to avoid. When you have a healthy organism you try to keep it healthy. When it is already sick — as most soils are — don't try to make it sicker. So hoeing and cultivating still have to be done, I'm afraid."

In a discussion of mulching, Mr. Escher pointed out that it is a labor-saving device as far as weeds are concerned, and it also preserves moisture. At the same time he warned of the danger of fungi, and suggested that the mulch should always be kept at least a few inches away from plants. And a drawback is that unless, for instance, you have used a partially broken-down compost "you have a non-composted material on your hands by Fall. This can be raked out and composted, or it can be sprayed with the Starter and plowed under."

He said that where a rototiller is used, one should be careful that the soil is not too wet. While it has been emphasized repeatedly that one should not plow a wet soil, it needs to be even less wet for a rototiller.

Mr. Y. K. Smith, manager of Globe Hill Farms, Pine Plains, N. Y., presented a detailed picture of the recent aerial spraying of D.D.T. under Federal auspices, against the gypsy moth, and the developments of the lawsuit brought against the U.S. Department of Agriculture and the State of New York in an endeavor to restrain the authorities from spraying land and buildings against their owners' will.

Lectures by W. Coda Martin, M.D., and Alice Heckel are reported elsewhere in this magazine.

Golden Acres, as most readers of Bio-Dynamics know, is a large, diversified biodynamic farm. Heinz Grotzke, who is in charge of the gardening there, reported in detail on the results with the various vegetable crops. Walter Stuber, owner of Golden Acres, presented a picture of recent developments on the entire place. In connection with the wide-spread trend toward feeding anti-biotics to young chickens, Mr. Stuber said that Golden Acres was preparing to grow earthworms in large quantities for feeding purposes.

At the annual meeting of the B.D. Association, presided over by Ralph Courtney, the president, the plea was again voiced by several people for factual reports of farm and garden experiences for publication in this quarterly. The editors also

reiterated their interest in receiving and using such material.

Dr. Donald B. Hull of Ridgewood, New Jersey, retiring as chairman of the membership committee, reported an increase of 74 members during the past year, with the total now standing at 492. He expressed his appreciation to the other members of the committee for their work and introduced Helen Philbrick as the new chairman. Mr. Courtney voiced the thanks of the members to the old and new chairmen and all who were working to increase the membership.

John Volkert of Winter Park, Florida, Ruth Eastman of Hamburg, N. Y., Dr. E. F. Winter of Rockland County, N. Y., and the Rev. John H. Philbrick were among those who gave brief talks at the report sessions. The Eurythmy Program on the evening of August 3rd was under the direction of Sabina Nordoff. The Eurythmists and speakers, and David Maddern at the piano, were enthusiastically applauded by the audience.

FRED HECKEL

FARM CONFERENCE AT GOLDEN ACRES

In Mid-September there was held the Bio-Dynamic Farm Conference at Golden Acres Farm, Newtown, Pa. Its purpose was "to introduce and demonstrate the practical application of the Bio-Dynamic Method in farming and gardening." The sessions, on which there is to be a report in our next number, opened on the evening of Friday, the 13th, with a reception, after which Dr. Ehrenfried Pfeiffer spoke on "New Points in Animal Nutrition."

Walter Stuber, owner of Golden Acres, opened the next morning's sessions with a talk on "The Growth of a B. D. Farm." He was followed by Dr. Pfeiffer, discussing "The High School of Composting." Heinz Grotzke and Carl Belke of Golden Acres then gave a Compost Demonstration. This afternoon was devoted to a visit to the various farms comprising Golden Acres, and a session for reports and discussion. In the evening, Wm. Coda Martin, M. D., presented a paper entitled "Insecticides — As the Physician Sees It."

The third day of the Conference began with a talk by Heinz Grotzke describing "The Growth of the Garden and Orchard," after which these divisions of Golden Acres were inspected at first hand by the conferees. On Sunday afternoon Dr. Pfeiffer's subject was "The Quality Concept: Soil-Nutrition," and the Conference ended with a visit to the Fetzer Farm at New Hope, Pa.

BIRDS IN THE BALANCE OF NATURE

Alice Heckel

Simply stated, the kingdoms of nature can be thought of as the mineral, the plant, the animal and the human. There they are, neatly listed one after the other. Yet the most primitive observation of the world as it lies spread about us yields the thought they are inextricably interwoven. The mineral kingdom provides the soil which is the basis for both the plant and animal life, the plants provide food for the animals, both provide food for men. Within each, other factors play in and influence development in one direction or another. The climatic and meteorological conditions influence the soil type and thus determine the plant families that thrive there and these in turn determine the animal population, and within this animal population there are the insects and the birds which feed upon the insects and certain of the plants.

Within the primeval forest, the prairie, the meadow, the mountain, the marsh, there is a characteristic association of plant, animal, insect, bird, in harmony with rainfall, sun, temperature and so on. It may be that particularly favorable conditions result in an overpopulation of one or another animal in some years. Nature brings things back into balance through her own wise measures, through predators, perhaps, again through starvation should the animal group increase beyond the capacity of the range to nourish it.

Undoubtedly the most disturbing factors are brought into play by man through his intervention in the interplay of natural forces. Many things have been written and said about the problems created by man in this way. Recently a young geneticist, Dr. Colvin Konzak, who works at Brookhaven, was quoted in an article in the New Yorker, on the subject. In Dr. Konzak's opinion, a serious consequence of today's large-scale farming techniques, which devote immense areas of land to a single variety of a single crop, in contrast to nature's way of intermingling a wide variety of plants, is that the world is rapidly running out of plant strains strong enough to resist disease. "There's an imbalance between predator and prey," he said. "Those great belts of wheat or corn are easy marks for the attack of certain fungi. The resiliency of nature — or of nature as it is now constituted — is being steadily sapped, and agronomists have all they can do to fend off the constantly increasing

hordes of pests, without looking ahead to the development of improved varieties of plants." What he says is, of course, just as aptly applied to the increase of insect pests, as it is to the increase of plant disease, and the weakening of plant varieties. At Brookhaven they are working with radiation, trying to speed up mutation and the development of new plant species, with the hope of being able to do more quickly what nature does over long periods of time.

A study of the development of the use of poisonous sprays in the control of insect pests shows us that this leads to a search for ever more deadly compounds, that many insects develop resistance to one spray and must have another compound applied before they can be successfully controlled, for a time at least. Let us turn from this rather devastating picture of the present and future of agriculture to the measures which nature takes to bring about balance and maintain it.

What part do the birds play in this pendulum swing which moves through the point of balance? There are many reported instances of birds saving crops in one locality or another. There is the famous story of the plague of Mormon crickets in Utah, many years ago. Shortly after the Mormons had settled there, they had a severe crop failure. They made a second planting, which was coming along quite well, when hordes of Mormon crickets appeared on the scene and started munching on the plants. However, before the crickets could do much damage, thousands of gulls flew into the fields, ate the insects, and saved the farmers from probable starvation. A monument was put up to the birds in grateful appreciation. It still stands in Salt Lake City. The most important value of birds, however, lies in their day to day pressure on the insect population. According to F. E. Beal (Yearbook of Agriculture 1908): "Whoever expects to find in birds beneficient organisms working with a sole view to the benefit of the human race will be doomed to disappointment. Birds eat food to sustain life, and in their selection are guided entirely by considerations of their own. If all species of insectivorous birds be considered as a whole, it is found that they eat insects of the various species in about the proportions in which these species exist in nature . . . It would appear that the true function of insectivorous birds is not so much to destroy this or that insect pest as it is to lessen the numbers of the insect tribe as a whole . . . to reduce to a lower level the great flood tide of insect life."

Other things contribute to the value of birds in the control of insects. There is the flexibility of the food habits of birds, a tendency to prey upon the most abundant (the harmful are usually the most abundant). Their mobility too makes them effective in moving to places of greatest concentration of a particular pest. Instances of the above have been noted in many places. One came under my own observation. In the last two or three years the common white birches in our area have been attacked by a leaf miner. In Spring, when these creatures are hatching out, the birches are filled with flocks of birds, chickadees, warblers, and others, feasting on this pest. There are too many birches scattered through the third and second growth woodland to make it economically possible to spray against this pest. I believe the birds will succeed in controlling it. For even in this year of drought enough leaves remained to keep the injured trees alive.

Many different species of harmful caterpillars are also controlled by birds. For instance, the tussock moth caterpillar is usually supposed to be too hairy for birds to eat. When they are common in Washington, D. C. nearly every robin seen carrying food to its young shows a telltale white fluff at the end of its bill. You see, robins *do* eat something besides earthworms, although one might not ordinarily think so, having watched them coursing over the lawn in search of earthworms. Mr. Alan G. Dunstan of Canada found that birds and ants are responsible for holding the tussock moth in check in the forests. Cases of local extermination of these moths are recorded for the English sparrow in Massachusetts and the hairy woodpecker in Ohio.

One up for the much maligned English sparrow. These humble birds have busied themselves in other parts of the United States too in this struggle for the control of insect pests. Most insects are destroyed during the nesting season when the parent birds have several hungry mouths to feed. In order to develop normally at certain stages, young birds must have at least their own weight in food each day. One or both parents will usually feed their brood many times an hour. From dawn to dusk the busy adults shuttle back and forth stuffing food into gaping mouths. In Utah, during an outbreak of the alfalfa weevil, it was estimated that a single brood of English sparrows accounted for 1980 larvae of the beetle daily, or this equivalent in other insects. Another bird often looked down upon and disliked, is the noisy, messy starling. But these too, work to man's benefit.

W. L. McAtee reports a case in which "starlings had locally extirpated a mixed infestation of brown-tail and gypsy moth larvae, and when E. H. Forbush was in charge of the gypsy moth campaign for Massachusetts, birds were observed to hold this moth so in check at one locality for several years that work by the State force was suspended . . . It was almost impossible to complete certain experiments with larvae protected by nets, because so many caterpillars were taken from the nets by birds. Sixty per cent of the larvae used in these experiments was destroyed by birds."

Half of the approximately 8600 different kinds of birds in the world eat a certain number of insects; many species depend primarily upon insects for their food. Some birds, such as warblers, swallows, flycatchers, and nighthawks eat insects regularly, while others eat the pests when available in large numbers. During a plague of the Rocky Mountain locust in the midwest some years ago, more than two hundred different kinds of birds were seen feeding on them. Meadow larks were given first credit for destroying an infestation of the Coulee cricket in the State of Washington, and woodpeckers cleared up a heavy concentration of spruce beetles in Idaho. Unfortunately, birds do not deliberately hunt out harmful insects. It is said that Kingbirds sometimes eat honey bees, but stomach examinations show that they mostly eat drones and the bees themselves take care of an over-population of drones by either killing or dumping out of the hive the extra ones. Ground beetles, lady beetles and others are also sometimes eaten by birds, but few instances are known where large enough numbers are destroyed to upset the balance of nature.

But what maintains the bird population at an effective level? Birds have so many enemies, so few of the young hatched reach maturity, why, even without man's intervention, are more birds not extinct? The following illustration of the balance of nature may have some bearing on an answer to these questions. A marshy area in New York State containing snapping turtles, ducks, skunks, and other animals, seemed well balanced until man came along. The turtles probably caught an occasional duckling, but the skunks presumably ate enough turtle eggs to keep the number of turtles within reasonable bounds. Then suddenly the price of skunk fur shot away up. People went into the swamp and killed great numbers of the mammals. The turtle population increased rapidly, and killed more and more

young ducks. The adult ducks, of course, did not like this state of affairs so they left the marsh for more satisfactory nesting grounds. The bottom then dropped out of the skunk fur market, the number killed became fewer, and the population increased. Snapping turtle soup became popular and the hunters turned to harvesting turtles. The skunks and people so reduced the population of snappers that the ducks returned and started using the marsh as a nesting site. The situation thus returned in essence to what it was before man stuck his nose into the community.

Amongst the enemies of the helpful birds many people count the hawks and the owls. Yet research consisting of studies of the stomachs of many kinds of hawks have shown that few do more harm than good and these are chiefly Cooper's hawk, a medium-sized species that kills game birds, song birds, and the smaller sharp-shinned hawk which feeds mainly on song birds. These are secretive in their habits and fly so swiftly that they are rarely seen. Most of the larger soaring hawks most often seen in the sky are either beneficial or, at least compensate for any damage by their positive contributions. Large numbers of rats, mice, gophers, insects, and other animals, which might otherwise eat the farmer out of house and home, are partially controlled by these birds of prey. Those which feed on game birds, are said to capture and consume chiefly individuals who are weaker than the others, either because of disease or too little food, and thus help to protect the others from epidemics of disease.

Of the predators, the owls can probably be counted as being more useful to man even than hawks; the number of pests they destroy is amazing. The great horned owl sometimes destroys game birds and poultry; and yet even he kills large numbers of pests. One study in which more than 125 stomachs of the great horned owl were examined, found only 31 containing game birds and poultry. The rest had eaten everything from insects to mice, a useful occupation for the species that is almost universally condemned.

Barn owls are probably most efficient of the family in this work. They feed primarily on rats, mice, and other harmful rodents. A biologist recently examined the bones and other remains from one barn owl nest over a three-month period. He found at least 240 different animals had been eaten during this time. Of these he was able to identify 89 field mice, 93 gophers, 27 kangaroo mice, 7 moles, 4 ground squirrels and 3 rabbits.

Indeed owls are better mousers and ratters than the usual domestic cat. Further proof than the story of the man with the rat-infested cellar is scarcely necessary. He shut several cats in over night for three or four days. Every morning when he opened the door the cats rushed out hissing and spitting with fear, and the rats continued to have a jolly good time. By chance he got an owl and put it in the cellar. The next morning 9 partly eaten rats were found, and for several weeks one or more were found daily. Finally the rats became so scarce that he had to buy raw meat to feed the owl. He probably could have worked up quite an exterminating business by hiring the owl out to his neighbors.

Fish hawks and kingfishers are also frowned upon by many sportsmen. Some people claim that they spoil the sport of the fisherman. But the latest theory is that they eat mostly non-game fish, or as the bald eagle dead or dying fish, and that they keep the fish population in balance so that they can attain a decent size for fishing. This theory seems justified by experience and observation. Reservoirs around which fish-eating birds have been slaughtered have contained large numbers of fish, most of them so small that they could barely swallow a hook. In other areas where fisheaters have been tolerated, fishing remains good even though the birds caught fish estimated at many thousands of pounds per year.

Another interesting example of the economic results of wiping out predators concerns hawks. Today many enlightened states have laws protecting the hawks, but some years ago "scalp acts" in several states offered a bounty for every hawk and owl that was killed. One such law, in effect for a year and a half, accounted for state payments of about 90 thousand dollars for more than 100 thousand owls and hawks killed during the period. A biologist then estimated the potential poultry loss during the period from hawks and owls at about $1875, an amount saved by spending $90,000. Then estimating the damage done by rats, mice, and other rodents still alive because of the decimated hawk and owl population, our biologist assessed the losses at more than 3 million dollars. These figures added up to the interesting if absurd total of more than two thousand dollars spent for each dollar saved. The result was that the scalp act was hastily repealed.

Fruit trees are attacked by many pests and it is, perhaps the orchardist who is most concerned with insect control, in-

volved in the heaviest spray programs and the greatest expense in trying to produce edible fruit. Fruit which turns out not to be truly edible after all since it is so impregnated with the residues of harmful and poisonous sprays that it is almost as much as one's life is worth to eat it nowadays. One of the worst orchard pests is the apple worm, the larvae of the codling moth. This creature is combatted most assiduously by the nuthatches and downy woodpeckers. In New Hampshire it was reported that "only 5 to 20% of the codling moths survive the winter . . . 87% were killed by birds, 4% by disease and 3% by cold. Encouragement of nuthatches and downies by establishing feeding stations in the orchard is certainly a much less expensive measure than repeated sprayings with unpronounceable chemicals.

Tanagers, chickadees, house wrens, orioles, warblers, purple finches, all feast on one or another of the insects or caterpillars that feast on the leaves of trees, both forest and orchard. Everybody knows about the European Cuckoo and its deplorable habit of depositing its eggs in other birds nests. Few know that the American Cuckoo does not do this. It builds a nest of its own, not a very good one, but eggs and young seem to survive, even though one can sometimes count the eggs by looking up through the nest from the bottom. They also eat tremendous amounts of harmful insects. Tent caterpillars are a favorite. In May and June when the tent caterpillars are at work, these make up half of the Cuckoo's food. One stomach, of some hundred or so examined, was so full that evidently the bird had eaten a whole tent colony, as there were several hundred in its stomach. Their stomachs often become completely lined with the hairs of these caterpillars. One hopes that this does not cause them any distress.

We have already mentioned feeding stations as one way of attracting birds. Drinking fountains are also attractive to birds. They are especially fond of running water. This is, of course, rather difficult to achieve, if one's land is not blessed with a brook. However, a simple measure, will make your bird bath more alluring. That is, to punch a small hole in the bottom of a small tin bucket suspend this over the fountain and fill it with water. The drip from the tiny hole livens things up considerably.

Some birds like nesting boxes; wrens, of course, and bluebirds. You can encourage these by putting up the proper and suitable kind of house. The Audubon literature is the best source for information on this subject. Others like shrubs, still

others prefer the ground. These you can help by the plantings on your place, seeing that there are places where the preferred kind of shelter is available. Owls and hawks like high platforms. Many birds prefer, or also like dust baths, it helps them to rid themselves of vermin; one can help here by making sure that there are places near the drinking fountain and feeding stations that are dry and dusty. If you supply artificial dust baths in flat boxes or troughs (to spare your greensward perhaps) be sure to change the dusty earth frequently so they won't pick the vermin up again.

Even the insect eaters like to supplement their diet with berries and fruit from trees and shrubs. Plantings of these will help also to satisfy the appetites of those who live primarily on berries and fruit so that they will not attack your table fruits. A neighbor complained this summer that the catbirds were eating up all his berries. Three or four families had nested on his place. Obviously he had an overpopulation of catbirds. I could only suggest that he try to hang things (metallic strips for example) around the berry patch to frighten them away.

The following table lists the fruits which are attractive to birds and might provide ideas for plantings:

Groups of fleshy fruits most attractive to birds throughout the United States

Name of fruit Common	Generic	Number	Desirable birds known to eat the fruit
Juniper; red cedar	Juniperus	54	Ruffed & sharp-tailed grouse, bobwhite, Eastern flicker, mockingbird, robin, E. bluebird, cedar wax-wing, myrtle warbler, evening & pine grosbeaks, purple finch.
Greenbriar	Smilax	44	Ruffed & sharp-tailed grouse, bobwhite, wild turkey, E. flicker, red-bellied woodpecker, mockingbird, catbird, brown thrasher, robin, hermit thrush, cardinal.
Bayberry	Myrica	86	Ruffed grouse, bobwhite, E. flicker, red-bellied & downy woodpecker, E. phoebe, tree swallow, chickadee, Carolina wren, catbird, brown thrasher, hermit thrush, E. bluebird, white-eyed vireo, myrtle warbler, meadowlark, E. towhee.
Hackberry	Celtis	48	Gambel's & scaled quails, E. flicker, yellow-bellied sapsucker, mockingbird, brown thrasher, robin, hermit thrush, E. bluebird, cedar waxwing, cardinal.
Mulberry	Morus	44	Yellow-billed cuckoo, red-bellied, red-headed & downy woodpeckers, E. kingbird, mockingbird, catbird, robin, wood thrush, cedar waxwing, red-eyed vireo, yellow warbler, orchard and Baltimore orioles, scarlet tanager, cardinal, purple finch.

Name of fruit Common	Generic	Number	Desirable birds known to eat the fruit
Pokeberry	Phytolacca	53	Bob-white, mourning dove, E. flicker, E. kingbird, mockingbird, catbird, robin, hermit, olive-backed & gray-cheeked thrushes, E. bluebird, cardinal, E. towhee.
Sassafras	Sassafras	19	Bobwhite, E. kingbird, catbird, robin, veery, red-eyed vireo.
Apple	Malus	44	Ruffed grouse, bobwhite, ring-necked pheasant, E. flicker, red-headed & Lewis' woodpeckers, mockingbird, robin, cedar waxwing, purple finch, pine grosbeak, red crossbill.
Chokeberry	Aronia	19	Ruffed & sharp-tailed grouse, bobwhite, brown thrasher, meadowlark.
Mountain-ash	Sorbus	14	Ruffed & sharp-tailed grouse, red-headed woodpecker, catbird, brown thrasher, robin, Bohemian and cedar waxwings, Baltimore oriole, evening & pine grosbeaks.
Juneberry	Amelanchier	42	E. flicker, red-headed woodpecker, catbird, robin, hermit thrush, veery, cedar waxwing, Baltimore oriole.
Hawthorn	Crataegus	39	Ruffed grouse, bobwhite, robin, purple finch, pine grosbeak.
Strawberry	Fragaria	53	Ruffed grouse, catbird, brown thrasher, robin, wood thrush, cedar waxwing, E. towhee.
Raspberry, Blackberry	Rubus	149	Ruffed & sharp-tailed grouse, bobwhite, E. flicker, red-headed woodpecker, E. kingbird, tufted titmouse, wren tit, mockingbird, catbird, brown thrasher, robin, wood & olive-backed thrushes, E. bluebird, cedar waxwing, red-eyed vireo, orchard & Baltimore orioles, cardinal, rose-breasted, black-headed, & pine grosbeaks, E. spotted & brown towhees, white-throated fox & song sparrows.
Rose	Rosa	42	Ruffed and sharp-tailed grouse, greater prairie chicken, bobwhite, robin.
Crowberry	Empetrum	42	Ruffed grouse, pine grosbeak, tree sparrow, snow bunting.
Sumac (non-poisonous)	Rhus	98	Ruffed grouse, bobwhite, valley quail, wild turkey, E. & W. flickers, red-headed & downy woodpeckers, phoebe, chickadee, wren tit, Carolina wren, mockingbird, catbird, brown & Calif. thrashers, robin, hermit & olive-backed thrushes, E. bluebird, white-eyed vireo, Audubon's warbler, goldfinch, E. towhee, golden-crowned sparrow.
Peppertree	Schinus	11	Robin, varied & hermit thrushes, cedar waxwing, silky flycatchers.
Holly	Ilex	49	Ruffed grouse, bobwhite, valley quail, E. flicker, mockingbird, catbird, brown thrasher, robin, hermit thrush, E. bluebird, cedar waxwing.
Supplejack	Berchemia	16	Mockingbird, robin.
Grape	Vitis	89	Ruffed grouse, bobwhite, wild turkey, E. & red-shafted flickers, red-bellied woodpecker, E. kingbird, mockingbird, catbird, brown thrasher, robin, wood thrush, veery, E. & W. bluebirds, cedar waxwing, cardinal.

Name of fruit Common	Generic	Number	Desirable birds known to eat the fruit
Virginia creeper	Parthenocissus	39	Ruffed grouse, bobwhite, E. flicker, red-bellied & red-headed woodpeckers, tufted titmouse, mockingbird, brown thrasher, robin, hermit, olive-backed & gray-cheeked thrushes, E. bluebird, red-eyed vireo, scarlet tanager, evening grosbeak, purple finch.
Buffaloberry	Shepherdia	19	Ruffed & sharp-tailed grouse, mockingbird, hermit thrush, pine grosbeak.
Wild sarsaparilla	Aralia	18	Ruffed grouse, bobwhite, robin.
Dogwood	Cornus	98	Ruffed & sharp-tailed grouse, bobwhite, E. & W. flickers, downy woodpecker, E. kingbird, catbird, brown thrasher, robin, hermit, wood, olive-backed, and gray-cheeked thrushes, veery, E. blue bird, cedar waxwing, red-eyed & warbling vireos, cardinal, evening & pine grosbeaks, purple finch, white-throated and song sparrows.
Sour gum tupelo	Nyssa	40	Ruffed grouse, bobwhite, wild turkey, E. flicker, brown thrasher, robin, olive-backed & gray-cheeked thrushes, E. bluebird, cedar waxwing, purple finch.
Wintergreen	Gaultheria	11	Ruffed & sharp-tailed grouse, wren tit.
Bearberry manzanita	Arctostaphylos	34	Dusky & ruffed grouse, valley & mountain quails, band-tailed pigeons, wren tit, fox sparrow.
Huckleberry	Gaylussacia	48	Ruffed grouse, robin, pine grosbeak, E. towhee.
Blueberry	Vaccinium	93	Ruffed grouse, greater prairie chicken, sharp-tailed grouse, bobwhite, valley quail, wild turkey, E. kingbird, black-capped chickadee, tufted titmouse, catbird, brown thrasher, robin, hermit thrush, E. bluebird, cedar waxwing, orchard oriole, cardinal, pine grosbeak, E. towhee, Tree sparrow.
Beautyberry	Callicarpa	11	Bobwhite, mockingbird, brown thrasher.
Partridgeberry	Mitchella	10	Ruffed grouse, bobwhite.
Honeysuckle	Lonicera	20	Bobwhite, catbird, brown thrasher, robin, hermit & olive-backed thrushes, pine grosbeak, white-throated sparrow.
Snowberry, Coralberry	Symphoricarpus	36	Ruffed & sharp-tailed grouse, bobwhite, valley quail, varied thrush, evening & pine grosbeak.
Blackhaw, high bush cranberry	Viburnum	35	Ruffed & sharp-tailed grouse, yellow-billed cuckoo, E. flicker, catbird, brown thrasher, robin, E. bluebird, cedar waxwing, purple finch, pine and rose-breasted grosbeaks, & the common redpoll.
Elderberry	Sambucus	120	Ruffed grouse, valley quail, E. flicker, red-headed woodpecker, E. & Arkansas kingbirds, black phoebe, wren tit, mockingbird, catbird, brown and Calif. thrashers, robin, olive-backed thrush, E. & W. bluebirds, silky flycatchers, red-eyed vireo, rose-breasted and black-headed grosbeaks, brown towhee, white-crowned sparrow.

There are many things one can do to encourage the helpful birds to spend the summer on one's place, and others to keep those around who like to spend the winter. Brush heaps make fine winter shelter for whole flocks of birds and can be cleared up in the summer and replaced with new cuttings in the fall. Winter shelter boxes can also be put up with the perches so arranged inside that they do not come above one another. These shelter boxes can be quite tall with a small opening at the bottom, keeping the warmer air inside. For owls, large shelter boxes with a larger opening, of course, and a perch for just one bird, are also appreciated. Birds like water in the winter too, and one can help to keep it from freezing by adding some drops of glycerin.

Examples of the beneficial activities of birds are endless. Add this information to the pleasure that their colors and songs give to man and we gain a clearer picture of their place in the balance of nature's constantly weaving, changing, expanding and contracting forces.

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INSECTICIDES TODAY AND TOMORROW

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The following paper formed the basis of Dr. Martin's lecture at the 1957 Bio-Dynamic Conference at Threefold Farm, Spring Valley, N. Y. The material had originally been presented at the annual convention of the Natural Food Associates, held in Little Rock, Arkansas, on February 14th and 15th of this year.

Last year at the annual convention of Natural Food Associates in Terre Haute, Indiana, I gave a report on the health of the nation. In this report, I will discuss the increase in degenerative diseases in the U. S. today and especially the problem of physical and mental deterioration of the young men of selective service age — and what influence insecticides may have on the future increase of these diseases.

From World War I in 1918, to the Korean War in 1950, a period of 32 years, there was an increase of rejections from

21.3% to 52%. This is an increase of 30.6% or approximately 1% per year. Even this marked increase of rejections is not a true picture of the health of the youth today as the physical standards for draftees in 1918 were very high, while in 1950 they were markedly lowered as the essential manpower could be obtained only by reducing the physical standard with respect to some defects and psychiatric conditions.

If this appalling speed of degeneration continues at the rate of 1% per year for our young people, then, within another 25 years, and that is a short period of time, 75% of the youth of the nation will be physically or mentally unfit for active military service. These figures are hard to believe but they are statistical facts obtained from the Selective reports. In fact, the time element may be shorter than we think, because, at a certain point, the degeneration may increase by geometric progression. In other words, it begins to act like a snowball.

Only the statistics for young men are used for two reasons:

1—They are the only accurate statistics available for the state of deterioration of the health of the nation.

2—Only those of reproductive age are biologically important for projecting the health of future generations. A nation must look to its youth for survival.

What is the most critical disease in this degenerative picture besides mental diseases and heart disease? The report of the American Cancer Society is well known to everyone. They say that one person out of four will develop cancer before they die — 25% of the population. A grand total of 40,000,000 people. Today, Cancer is no longer a disease of the older people. It is becoming an ever increasing health problem of young people. This increase in Cancer is not confined to the U. S. The W. H. O. reports that Cancer ranks as the second cause of death in most highly developed countries. Cancer is rapidly approaching the epidemic proportions of the "Black Plague" of the Middle Ages. This is in spite of all our technological and scientific knowledge in the year 1957.

What is the relationship of these harrowing mortality and morbidity figures and the subject of insecticides? I am well aware that the study of degenerative disease is a complex matter and that there are numerous known and unknown factors involved in their development in the human body. One major factor — malnutrition — has been discussed here on this program on many occasions. But this and many other factors are

all long range educational programs. Other factors will require long periods of basic research to establish their relationship to the cause of degenerative disease.

But there has been something new added to the long list of etiological factors of degenerative diseases. This new factor is man made and under human control. Thus it can be eliminated by an order from the Department of Health, Education and Welfare and through the powers of the U. S. Public Health Service. These agencies were established to protect the health of the Nation and they are given power to invoke, in case of epidemics, emergency laws to control the epidemic and protect the health of the people. Man-made and man-applied substances can be immediately controlled if so desired.

Previously, we have thought of epidemics in the form of an invading organism carried by specific vectors or caused by lax sanitary conditions. Today, we are faced by a different form of epidemic — a slow, progressive, internal deterioration of the tissues and cells of the body. The old methods of detection and control are not applicable to the present situation.

For such a situation as we are faced with today regarding the degenerative diseases, there must be a new approach with open minds, and not biased by political or economic reasons. I particularly stress the latter because the insecticide chemicals are sold under the name of economic poisons.

What is this new and man made, etiological factor that has been added to our already weakened and deteriorated bodies? About 1945, the chlorinated hydrocarbons (DDT and its derivatives) were added to the pesticide scene of agriculture. This triggered the synthetic chemical pesticide production which reached the figure of 42 million tons, total farm chemical sales in 1956. The sales price to the farmer reached $290 million in 1956 (Chemical Week, Oct. 27, 1956).

By 1975, approximately 20 years from now, the chemical industry expects the sales of pesticides to reach an estimated $1 billion dollars.

There is expected to be an increase of farm acreage from a 1950 level of 1.184 billion acres to an estimated 1.280 billion acres by 1970 or an increase of about 1% in the same period of time. The chemical industry expects a 284% increase in the use of chemical pesticides from 1954 to 1975 in spite of the fact that there will be an increase of less than 1% in farm acreage. In other words, this 284% increase in pesticides will have to be

used on only 1% increase in land acreage. By that time, we will be knee high in chemicals on our farms.

I feel that we should stop for a minute before we plunge into this sea of chemicals and re-appraise the present-day situation to determine if this marked increase in the use of pesticides on our farms is necessary or will be an extra economic burden on the farmer, as well as an increased health hazard for the public who must consume the farm produce as their only source of food supply. The question may be asked — Is the use of these economic poisons necessary for survival or is it slow national suicide? But first, let us review the chemical problem as it stands today — 10 years after the introduction of the chlorinated hydrocarbon and organic phosphorous compounds. (Parathion group.) Have they produced the desired results in controlling insects? In spite of the annual use of 42 million tons of pesticides, at a cost to the farmer of $290 million per year, the annual crop loss to insects in the U. S. is still more than three billion dollars according to federal and state studies. This staggering loss occurs despite the best control methods available to the farmer today.

It is apparent then that crop loss to insects has not been controlled with these new insecticides. But what else has happened? One of the big problems with DDT as well as other chlorinated insecticides, is that, in this 10 year period, the insects have built up a resistance to them. Because of this, it has been necessary to use a more poisonous and toxic phosphorous-containing insecticide, known as Parathion. This pesticide has a similar chemical formula to the army's highly secret nerve gas. One drop on the skin, will kill a person in 30 seconds. Parathion compounds are only a partial answer to the insecticide problem as certain insects are already becoming resistant to even these more highly toxic chemicals. Altogether there are more than 180 chemical pesticides being produced and used today on our agricultural farms.

I believe the following statement from a meeting of the Executive Board of the World Health Organization in June, 1956 will give us a clear and concise answer to this question of whether insects are being controlled:

"The conclusion was that the development of resistance of insect vectors to insecticides has become a serious public health problem. 32 countries have reported insect resistance to DDT and other new insecticides. About 35 species of insects, includ-

ing various types of malaria bearing mosquitoes show immunity to DDT in some areas of Greece, Lebanon, Indonesia, Saudi Arabia, Panama and Mississippi. Body lice, vectors of typhus, can no longer be controlled with DDT in Korea, and five other countries report that satisfactory control is becoming difficult. Fleas, responsible for Plague, are manifesting resistance in certain parts of South America. But, worse still, a strain of mosquitoes that spread Yellow Fever has shown itself extremely resistant to DDT in Trinidad. The destruction of flies with DDT and other chemicals is no longer possible in almost all countries where these materials have been used in recent years. The new insecticides that have become available in the last three years are too few, too limited in efficiency and too toxic."

A. D. Hess, Logan Field Station, of the U.S.P.H. Communicable Disease Center, Logan, Utah, (reported in Scope, Weekly, 6/20/56) has come to the same conclusion. He declared that the insect problem in the U. S. is mounting because of the increase of breeding potentials and because of the development of insecticide resistance. (Science News Letter Aug. 27, 1955.) Also, according to researchers at the University of California, they have discovered that the use of insecticides may kill off the beneficial insects and allow pests to come back in more devastating numbers.

Reports too numerous to mention, show that blanket spraying of insecticides from the air and on the ground destroys many beneficial insects and animals, such as bees, birds, fish, etc.

Walter P. Nickell, a naturalist of the Cranbrook Institute of Science (Birmingham, Mich., 6/7/56) stated that not enough is known about the long range effects of DDT and other insecticides. They kill the beneficial insects, even the soil bacteria and, in general, upset the balance of nature. He further stated that the results are not very pleasant to contemplate. We may even find the use of DDT more destructive of human life than the hydrogen bomb.

Here we have a unanimous agreement, which is most unusual, that the use of these insecticides has not only failed to produce the desired results, but has placed us in a very precarious position of having developed stronger and more resistant insects and, at the same time, having destroyed many of nature's beneficial and protective insects thus upsetting nature's balance and leaving us at the mercy of these newer and more dangerous insects.

What has happened to these millions of tons of chemical insecticides that are sprayed on our farmlands? Do they disintegrate and disappear — or are they accumulating in the soil? If so, when will they reach the saturation point? A study in 1955, by the Entomology Research Branch of U.S.D.A. Yakima, Wash. gives us a clue to where we can find most of these insecticides used on the farms during the past 10 years.

Examination of the soil revealed that three and one half years after treating the soil approximately 50% of the DDT, 14% of the B.H.C. and Lindane, 15% of the Aldrin were found in the surface 6 inches of the soil. The results of this study showed that DDT has the most harmful and most persistent effects of the several insecticides added to the soil. Similar tests were made in Ill., N. J. and Ga., with equivalent results: showing that the accumulation of these insecticides in the soil is national in scope. Also, the study showed that DDT applications from 24 lbs. per acre and up were highly toxic to certain types of beans and delayed growth and affected the stand of rye in all the 5 years of the experiment. Their conclusion was that the persistence of DDT indicates that this insecticide might become a problem with continued use.

What is the chemical scientist's answer to this situation? A 284% increase in the use of these and more toxic insecticides in the next few years. Sounds very much like the talk of Tweedle Dum and Tweedle Dee.

The main point of this paper is to show what influence the extensive use of these highly toxic chemical insecticides has on the future health of the human being. In the final analysis, we are the recipients of these sprays, either by direct spraying, by inhalation, or by ingestion from contaminated food.

It is an accepted fact and confirmed by the U.S.P.H. Service that all foods purchased from the open market today carry a high residue of many of these insecticides, as they are sprayed approximately once a week during the growing season with one or more of these chemicals. In fact, the mass poisoning of the human race has been legalized by a Congressional law. They have set up what is known as tolerance levels for each of the many chemical insecticide sprays. For instance, 7 PPM of DDT is allowed on every article of food consumed. Each other insecticide has its own legal tolerance level. When the law was passed the tolerance level was estimated on the use of only one insecticide on each article of food. A recent report from the

U.S.P.H. Service states that when two or more chemicals are on one item of food, which is the usual case today, the toxic effect is increased and therefore, they are considering a re-appraisal of today's tolerance levels. Unfortunately, it takes several years to get Congressional action to change a law that is on the statute books. In the meantime, the population will be subjected to this increased amount of toxic chemicals. These legal tolerance levels for insecticides on plants do not give a true picture of the amount of insecticides consumed on foods. Many foods contain higher amounts of these chemicals and cannot be adequately checked with the present facilities of the F.D.A. For instance, recent private analysis reveals that eggs contain 50 PPM or more of DDT, cheese 150 PPM, bread 100 PPM, stewed dried fruits 69 PPM, lard and butter may be as high as 2000 PPM.

Is there a human tolerance level of DDT and other insecticides? It is no secret that the tolerance levels of DDT on foods for human consumption should be zero.

A report from the Food and Drug officials (Bulletin of the Association of Food and Drug Officials of the U. S. Vol. XIV No. 3 July 1950) states: "DDT is stored at a level 6-28 times the dietary intake. There is no floor of dietary concentration below which the storage of DDT does not occur."

Dr. A. J. Lehman of the Federal Food and Drug Administration (U. S. Government Printing Office 1951) stated: "In my opinion, Chlordane is one of the most toxic insecticides we have to deal with. I would hesitate to eat food that had any chlordane on it whatsoever."

In a more recent report from the U. S. P. H. Service, it was shown that volunteer prisoners were fed the equivalent of 200 times the usual amount of DDT found in our foods today and the body storage of DDT increased from what is today considered a normal level of 7-11 PPM to 234-340 PPM in 18 months. The conclusion was, that as these men did not reveal any physical or chemical pathology at the end of 18 months, the consumption of DDT was not a health hazard.

This short range study of 18 months does not take into consideration the fact that today babies begin to ingest DDT from birth from the mother's milk and later from cow's milk and other foods. The baby will continue this intake three times a day for as long as he lives.

The fact is, that it has been shown in tests on small animals that it is not always the short range large dose of insecticides but repeated small doses until toxic levels accumulate that is so dangerous. It is not likely that a person will get a lethal dose of chemicals from the food, but he does get repeated daily small amounts. What long range influence does this have on human health? It has been demonstrated that DDT concentrations of 3 - 30 PPM inhibit rat heart cytochrome oxidase and interfere with the process of phosphorylation. (J.A.M.A., March, 1951.) Storage of a toxicant in the fat of parenchymal cells is essentially storage in the cell itself where such important enzymatic processes as oxidation, phosphorylation and chloresterol synthesis take place. In simple terms these insecticide chemicals are stored in this fat tissue and do interfere with the normal oxygen supply to the cells of the body.

What influence does the interference of these important enzyme reactions have on our health? Health research today is focused on the chemistry of the cell. It is recognized that normal intra-cellular chemistry is the most important factor in a healthy body. Normal health is a delicate balance between various cellular stimulators and inhibitors. Anything that disturbs this balance will produce ill health and possibly some form of degenerative disease.

Dr. Henry Goldblatt (Cedars of Lebanon Hospital, Los Angeles, Cal. April 1953) found that by intermittently depriving a piece of rat's heart tissue in a test tube, of oxygen, the cells were gradually transformed until they acquired all the microscopic features of malignant cells.

Other clinical and experimental tests have shown that any interference with the oxidation to the cells will cause them to die and thus produce pathology of the tissues, or will interfere with the normal function of certain organs or glands of the body. This deterioration of the tissue cells results in degenerative diseases of various types as seen in people today — as well as the development of cancer.

It is well to remember that the danger to health is a delayed action and it is the repeated daily small insults to the enzyme system over a period of many years which constitutes a distinct health hazard. This fact has been confirmed by the research on the influence of tobacco on the production of cancer of the lung. They found the danger of cancer increased rapidly after smoking for 20 to 30 years.

Dr. Otto Warburg also stressed the fact that the transition from a normal cell to a cancer cell, when there is an interference of oxygen supply may be over a period of years.

We, of the age of 50 years or more, may survive and live out our three score and ten years assigned to us by the Bible — or the life expectancy of 67 years according to our present day vital statistics. But what of the child born today? What effect will this interference with the important oxidative enzyme system caused by insecticides from birth have on his future health and life expectancy.

We can no longer think of the long range effects of these insecticides on only the present generation: but we must think of their influence on the health of the future generations.

We have much experimental evidence in animals to show that any interference with the oxidative enzyme system of the foetus during the early embryonic stage of development will cause structural changes in the tissue and organs of the body, as well as a marked increase in congenital deformities.

What does this mean to future generations? The results of extensive studies at the Harvard School of Public Health indicate that maternal diseases and other critical stresses occurring at certain stages during pregnancy are responsible for a majority of congenital anomalies — oxygen deficiency to the cells as produced by the insecticides is a non-specific form of stress — also in 1947, it was shown by Ingall's that the lack of oxygen is a specific cause of congenital deformity. The congenital deformity of Mongolism occurs at the 8th week of embryonic development. We do not have such positive proof for the cause of mentally retarded children but this condition is accepted as a form of congenital deformity of the brain tissue. A recent report from the Foundation for Retarded Children states that there is a mentally retarded child born every 15 minutes in the U. S. today. It has been recently discovered that the brain of a mentally sick person uses a lower than normal amount of oxygen. (Science News Letter, Dec. 22. 1956.) Will the continued accumulation of the insecticides in the fatty tissue of mothers during pregnancy, which acts as an inhibitor to the oxygen supply to the cells, cause an increase in these congenital anomalies in the future? An opinion based on the above facts must come to this conclusion. The chance of a similar prediction can be made for congenital cancer which is already on the increase — as well as cancer in young people.

This procedure is what Drs. Philip Norman and James Rorty called "Unfitting the Unborn."

These statements may seem to exaggerate our present health problems but I can assure you that there is an ever increasing amount of evidence to confirm this viewpoint.

But what does the future hold for us in the field of insecticides? As previously stated we can expect a 284% increase in the use of the present insecticides or their equivalent in the newer and more toxic substances in the next 10-20 years. There is no alternative — as the insects develop immunity to each insecticide, more toxic ones must be developed and utilized or the entire basis for the chemical approach to the insect problem will fail.

In the future we can expect the insecticide to be applied before the crop is even planted. A substance called "thimet" has been developed to coat the seeds so that it later enters the system of the plant when the seed begins to sprout. This is an organic phosphate chemical related to the army nerve gas — if an insect bites the plant, he is killed — What about the animal or human that eats the plant?

Endotal is another chemical of the future which is now commercially available for use as a defoliant. This chemical as well as Lindane has been shown to have mutagenic activity. This means that these chemicals interfere with normal cell division in the embryo and thus causes mutations. If so, the genetic results for man and plants may well be unpleasant or even catastrophic according to a report in a recent issue of the Journal of Heredity. (Cytological and Genetical effects of the defoliant Endothal. J. Heredity — July — August. 1956.) Thus the future outlook for insecticides appears to be more hazardous than has been anticipated.

The physical and mental strength of our nation is being lowered daily by the effects of these insecticides on our body metabolism and there is reason to believe that the effects will be increased with their future use — Unless something is done to control the use of these insecticides on our foods before the deterioration of the nation's health reaches a point of no return, it may well be catastrophic. That time could be in the foreseeable future if the mass poisoning of the human population continues to increase as outlined for the next 20 years.

So far in this report, I have given only a negative critical analysis of the problem. This alone is not sufficient. Criticism

should be constructive and an alternate or better plan should be given.

The better plan, of course, is that recommended and applied by members of the Natural Food Associates, and other groups of farmers that are using similar methods to transform their land into "Living Soil," and growing plants free of harmful chemicals. Such soil produces quality food with the highest nutritional value which in turn improves the physical and mental status of the nation.

In certain instances when sprays are required, they should be non-cumulative and if possible non-toxic repellents. It is said that this ideal is not economically feasible — but the members of N. F. A. have shown this belief to be false. But this, we must understand and accept — Good health for future generations of our children is priceless!

NATURAL FOOD ASSOCIATES

Shortly before going to press we received notice of the Convention of the New York State Chapter of the Natural Food Associates, at Watkins Glen, October 5th. The scheduled speakers included Mr. Justin Brande of Middlebury, Vt., Dr. Pfeiffer, Royal Lee, D.D.S., of Milwaukee, Wis., Dr. Wm. Coda Martin, Dr. Robert Little of Hudson, N. Y., and Dr. Joe Nichols, National President of N.F.A. Mr. George Foster, president of the New York State Chapter, presided.

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